Turner, B.L. 2012. Taxonomy and distribution of the *Zinnia acerosa* (Asteraceae) complex. Phytoneuron 2012-19: 1–8.
Published 23 February 2012. ISSN 2153 733X

TAXONOMY AND DISTRIBUTION OF THE *ZINNIA ACERO*SA (ASTERACEAE) COMPLEX

BILLIE L. TURNER
Plant Resources Center
The University of Texas
Austin, TX 78712

ABSTRACT

A taxonomic treatment of the *Zinnia acerosa* (DC.) A. Gray complex is provided. Six species are recognized: *Zinnia acerosa*, **Zinnia austrotexana** B.L. Turner, sp. nov., *Zinnia citrea* Torres, **Zinnia guanajuatensis** comb. et stat. nov., **Zinnia coahuilana** B.L. Turner, sp. nov., and *Zinnia oligantha* I.M. Johnst. Photos of the type specimens of the new taxa are provided along with a map showing their distributions.

KEY WORDS: Asteraceae, *Zinnia, Z. acerosa,* Texas, Mexico, Coahuila

Zinnia acerosa is typified by material collected in the Mexican state of San Luis Potosí by Berlandier (Torres 1963). Torres, following Robinson and Greenman (1896), placed *Z. pumila* A. Gray, typified by a Gregg collection from south-central Coahuila, as the only synonym of the species. I also accept such a disposition.

Torres did not recognize infraspecific taxa within his concept of *Zinnia acerosa*, but he did propose new specific taxa from among its cohorts, namely *Z. citrea*, a tetraploid taxon having bright yellow rays but otherwise very similar to *Z. acerosa*. Its validity also is accepted here and I also propose below three new species from the *Z. acerosa* complex — *Z. coahuilana*, a striking taxon with elongate, ciliate-margined but otherwise glabrous leaves and markedly pedunculate, large heads bearing 8 ray florets; *Z. guanajuatensis*, a localized taxon from the state of Guanajuato, Mexico, possessing a prostrate habit, originally proposed as a variety of *Z. acerosa* by Rzedowski and Rzedowski (1996); and *Z. austrotexana*, a highly localizd taxon of southern Texas having more numerous disc and ray florets that dry pale yellow. The following key should serve to identify members of the *Zinnia acerosa* complex, as currently perceived.

Key to the **Zinnia acerosa** complex

1. Rays bright lemon-yellow ..... **Zinnia citrea**
1. Rays white or pale lemon-yellow.

    2. Ray florets 2–3; disc florets 2–4(–5) ..... **Zinnia oligantha**
    2. Ray florets 5–8; disc florets 5–20.

        3. Leaves elongate, ca 3 cm long, glabrous; north-central Coahuila ..... **Zinnia coahuilana**
        3. Leaves variously curvate, 1–2 cm long, clearly pubescent; widespread.

            4. Stems mostly prostrate; Guanajuato, Mexico ..... **Zinnia guanajuatensis**
            4. Stems mostly erect; USA and north-central Mexico.

                5. Ray florets 5–8, the ligules drying pale yellow; disc florets 10–20 ..... **Zinnia austrotexana**
                5. Ray florets mostly 5, the ligules drying chalky white; disc florets 5–10 ..... **Zinnia acerosa**

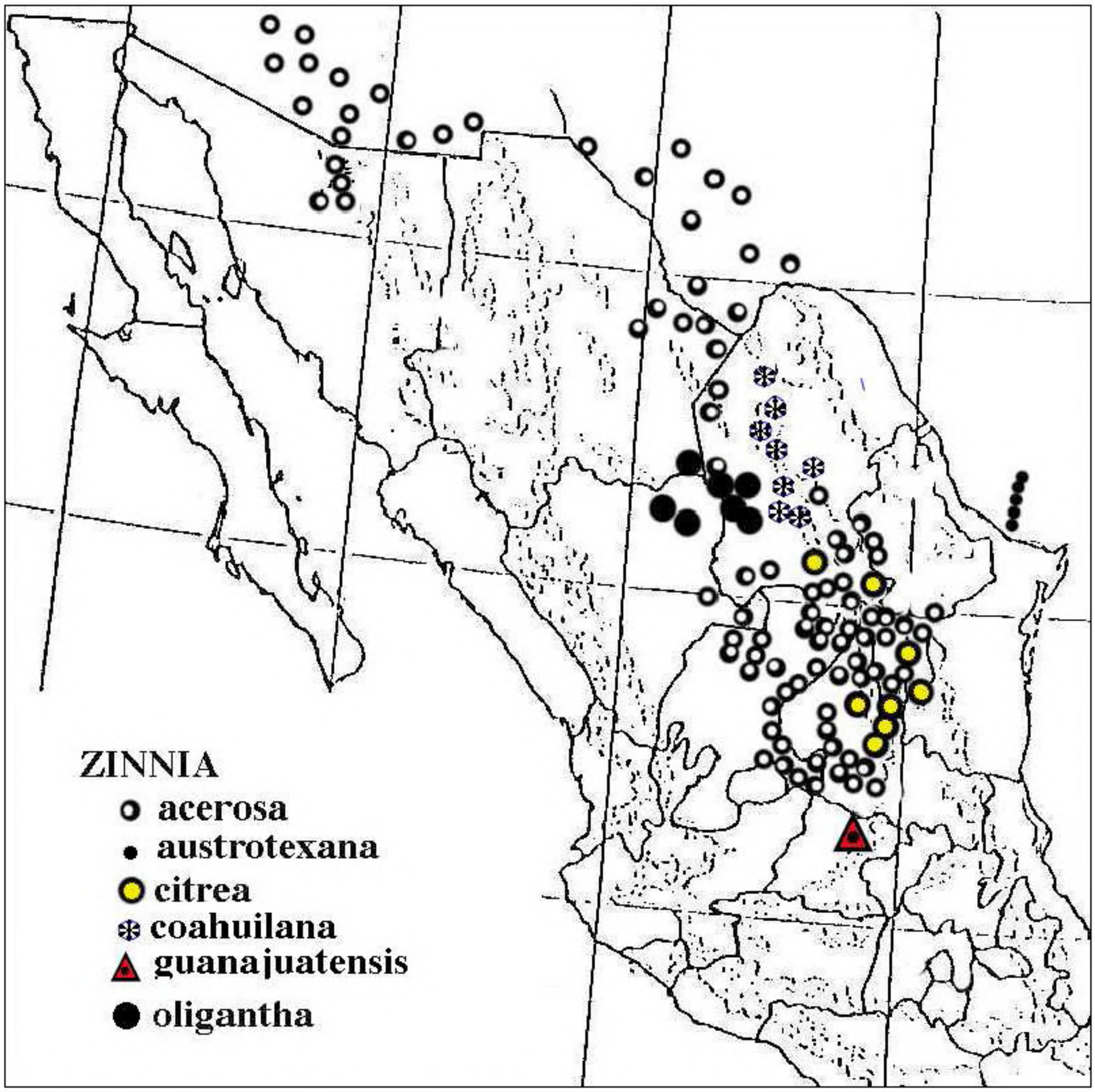

Figure 1. Distribution of the *Zinnia acerosa* complex.

ZINNIA ACEROSA (DC.) A. Gray, Pl. Wright. 1: 105. 1850. *Diplothrix acerosa* DC., Prodr. 5: 611. 1836. TYPE: **MEXICO. San Luis Potosí**. Dec 1827, *J.L. Berlandier 1343* (holotype: G-DC; isotypes: MO digital image!, NY).

Zinnia pumila A. Gray, Mem. Amer. Acad. Arts, n. ser., 4: 81. 1849. LECTOTYPE (designated here): **MEXICO. Coahuila**: Near San Juan de la Vaqueria, high plain, 20 May 1847, *J. Gregg 722* (GH). Annotated by A. Gray as "n. sp."

Torres cited the type as "T: High plains near San Juan de la Vequeria, and at Castaniola in northern Mexico, *Gregg 279*, GH!," essentially repeating the protologue for the geographic information ("High plain near San Juan de la Vequeria, and at Castaniola, in North Mexico, Dr. Gregg"). The choice of "type" by Torres, however, is problematic. In 1959 he annotated as *Zinnia pumila* this sheet: **Coahuila**. Near Buena Vista Battlefield, dry plains, 24 Jul 1848, *J. Gregg 279* (GH). Another GH sheet has two specimens of *Zinnia* mounted at the bottom: (1) *Gregg 279* with the same collection data as the one above and (2)

Gregg 722, as in the type citation above; this sheet has two non-type collections mounted on the upper portion (fide HUH 2012). *Gregg 722* (not *279*) is the appropriate choice of lectotype.

As noted by Torres (1963, p. 9), "The species includes four known chromosome races (n = 10, 11, 19, and 20), which cannot be distinguished morphologically at the present time. ... Genetically, the widespread n = 10 race is most closely allied to *Z. juniperifolia* (Torres 1961), although morphologically it is closely similar to *Z. oligantha*. The n = 20 race is of alloploid origin to judge from crossing results; possibly it is an allotetraploid derived from *Z. acerosa* (n = 10) and *Z. oligantha*." Torres's diploid counts for *Z. acerosa* were from San Luis Potosí, Arizona, and New Mexico; tetraploid counts were from Texas (Brewster Co.) and Coahuila (near Saltillo).

ZINNIA AUSTROTEXANA B.L. Turner, **sp. nov.** Figure 1. **TYPE: USA. TEXAS. Starr Co.:** rare in opening in medium-stature thorn shrubland on gravelly saline clay soils (Catarina Series), on gentle slope underlain by Catahoula and Frio formations undivided, NE of near cabin along S fenceline on Las Estrellas Preserve, ca 7.5 mi NW to NNW of jct US 83 and F. M. 755 in downtown Rio Grande City, 270 ft, 5 Aug 2010, *W.R. Carr 29100* with A. Treuer-Kuehn (holotype: TEX).

Resembling *Zinnia acerosa* (DC.) Gray but ray florets mostly more numerous ((5–)8 vs 4–6), ligules, upon drying, pale lemon-yellow (vs white), and usually more numerous disc florets (10–20 vs 10 or fewer). The epithet refers to southern Texas, to which the taxon is confined.

Suffruticose taprooted herbs, 10–15 cm high. **Leaves** loosely arcuate, 10–20 mm long, pubescent with short hairs. **Heads** campanulate, 6–10 mm high, 4–8 mm across (rays excluded); bracts imbricate, 4–6 seriate, their apices broadly rounded and ciliate. **Peduncles** sparsely pubescent, 5–12 mm long. **Ray florets** (5–)8, pistillate, fertile; ligules drying pale lemon-yellow, 5–8 mm long, 4–6 mm wide; achenes ca 3 mm long, epappose or minutely 2-awned. **Disc florets** 10–20; corollas glabrous, yellow; achenes ca 3 mm long, pubescent with short erect hairs; pappus of 2 short awns, or absent. **Chromosome number**, n = 10 pairs, plus a single univalent (*Turner 4499*, TEX).

Additional collections examined. **USA. TEXAS.** Jim Hogg Co.: 12 mi S of Petroleum, 28 Jun 1962, *Correll & Johnston 25634* (LL); ca 1 mi S of Thompsonville, on rocky slopes of breaks, 13 Jun 1963, *Correll & Wasshausen 27718* (LL); San Antonio Viejo Ranch, local on shallow, gravelly soil over the Catahoula formation, 30 Oct 2010, *Treuer-Kuehn IV-0941* (TEX); 17.6 mi SW of Hebbronville along Farm Rd. 3073, 5 Jun 1983, *Turner 15116* (TEX). Starr Co.: 8 mi N of Rio Grande City, 31 Aug 1932, *Clover 479* (LL); 10 mi N of Rio Grande City, 29-30 Sep 1951, *Runyon 4405* (TEX); local on shallow, gravelly soil over the Goliad formation, 26° 45' 29.582" N, 98° 46' 58.569" W, 14 Oct 2010, *Treuer-Kuehn IV-0951.2* (TEX); 9 mi W of Rio Grande City, 8 Mar 1959, *Turner 4499* (TEX); dry hills, Fronton Road, 9 Oct 1965, *Wood 511* (TEX).

Zinnia austrotexana is relatively rare and is known to occur only along the roadsides of westernmost Jim Hogg and Starr counties (Fig. 3), mostly between Miranda City and Roma, where geological outcroppings of Frio Clay and Catahoula tuff occur, this well documented by the comments of Carr on the label of the type collection. Torres (1963) apparently did not examine material of the novelty, to judge from his description of *Z. acerosa*, which noted that it had "4-6" ray florets and "8-13" disc florets. Plants of *Z. austrotexana* typically have 8 ray florets and 10–20 disc florets, but occasional plants have 5–6 ray florets.

My initial inclinations were to treat this relatively isolated, south Texas population system as a variety of *Zinnia. acerosa* in recognition of its relatively weak morphological differentiation, but its seemingly consistent number of ray and disc florets, rarity, and confinement to specific geological outcrops has led to its treatment at the specific level.

In the fall of 2011, in company with Jana Kos, I revisited the two sites from which specimens of *Zinnia austrotexana* were gathered much earlier, but we were unable to relocate the taxon, perhaps due to the unusual drought conditions of that year but surely also to the considerable disturbances at the sites concerned. The Starr County location is now an assemblage of roadside houses.

UNIVERSITY OF TEXAS HERBARIUM
TEX
0 1 2 3 4 5 6 7 8 9 10 cm
copyright reserved
HOLOTYPE OF:
Zinnia austrotexana B.L. Turner
The University of Texas Herbarium (TEX)
Zinnia acerosa var. austrotexana B.L. Turner
Det. B.L. Turner 2011
FLORA OF TEXAS
The Nature Conservancy of Texas
Zinnia acerosa (DC.) Gray
STARR CO.: rare in opening in medium-stature thorn shrubland on gravelly saline clay soils (Catarina Series), on gentle slope underlain by Catahoula and Frio formations undivided, NE of near cabin along S fenceline on Las Estrellas Preserve, ca. 7.5 mi NW to NNW of jct. US 83 and F. M. 755 in downtown Rio Grande City, at N26°28'24.7", W098°52'19.4". Rio Grande City North Quadrangle. Elev. 270 ft.
W. R. Carr #29100 5 August 2010
(with Amie Treuer-Kuehn)

Figure 2. *Zinnia austrotexana*, holotype TEX.

Figure 3a, b. *Zinnia austrotexana* at the type locality in Starr County, Texas. Photos by Bill Carr.

ZINNIA CITREA Torres, Madrono 15: 215. 1960. **TYPE: MEXICO. San Luis Potosí.** Mpio. de Guadalcazar: near San Domingo, 1979 [the type grown in the greenhouse from seed collected at the type locality], *A.M. Torres 139* (holotype: IND).

According to Torres (1963), *Zinnia citrea* is a tetraploid, possessing characters of both *Z. juniperifolia* and *Z. acerosa*. Because of this he suggested that it might be "an allopatric derivative of the two."

Zinnia citrea is known to occur within populations of the white-rayed *Z. acerosa,* no intermediates observed (as noted on the collection label of *Nesom 6694*, TEX). The distribution of *Z. citrea*, as currently known, is shown in Figure 2.

ZINNIA COAHUILANA B.L. Turner, **sp. nov.** Figure 2. **TYPE: MEXICO. Coahuila.** ca 39 mi SSW of Cuatro Cienagas, on the upper limestone slopes of Sierra de Los Alamitos, 11.6 road miles S of Hwy 30, on the road to Los Cuates de Australia, starting just W of El Hundido, near KM 139, S-facing slope, 23 Sep 2004, *J. Henrickson 24116* (holotype: TEX).

Resembling *Zinnia acerosa* (DC.) A. Gray but the leaves ca 3 cm long and straight (vs 1–2 cm and variously recurved), glabrous with sparsely short-ciliate margins (vs variously pubescent with mostly eciliate margins); heads with mostly 8 ray florets (vs 4–6) borne on nearly glabrous peduncles 2–4 cm long (vs mostly 2 cm long or less).

Perennial herbs, 10–20 cm high. **Midstem and upper leaves** mostly linear, ca 3 cm long, glabrous or nearly so, the margins minutely, but sparsely ciliate. **Heads** 10–11 mm high, 5–6 mm wide (rays excluded). **Peduncles** 2–4 cm long, sparsely pubescent to glabrate. **Involucres** glabrous or nearly so; bracts imbricate, 5–6 seriate, their apices broadly rounded with scarious margins. **Recptacles** conical, ca 1 mm high, 1.5 mm across; pales scarious, linear-lanceolate, ca 8 mm long. **Ray florets** 8, pistillate, fertile; ligules white, 9–12 mm long, 5–7 mm wide; achenes ca 5 mm long, 1.5 mm wide, epappose. **Disc florets** ca 20 per head; corollas yellow, 4–5 mm long, glabrous; achenes 3–4 mm long, black, glabrous or nearly so; pappus of 2 unequal awns, 1–4 mm long.

Representative collections examined. **MEXICO. Coahuila.** Mpio. M. Muzquiz: ca 130 road km NW of Muzquiz on Coa Hwy 2A, mid slope of Sa. La Encantada basin and mining areas, scattered but common on relatively flat areas near bottom of slope, forming large masses, 28° 30' 40" N, 102° 19' 30" W, 3 Jun 1992, *Nesom 7389* (TEX); Mpio Ocampo: La Cuesta del Plomo on the Muzquiz-Boquillas highway, 1750–1775 m, 28° 44' N, 102° 31' W, steep limestone slopes and canyons, 14 Sep 1972, *Chiang* et al. *9213a* (TEX); Mpio. San Pedro Colonias: northern flank of Sierra de los Alamitos, 26° 20' N, 102° 20' W, 1450 m, 13 Jun 1972, *Chiang et al. 7716* (TEX); Mpio Villa Acuna: Rancho El Rincon, SW margin of Serranias del Burro, ca 80 km SE of Big Bend National Park, Texas, 1400–2100 m, 23 Jun 1991, *Ruiz 43*; same locality, 15 Jul 1991, *Ruiz 110* (TEX).

Zinnia coahuilana is clearly closely related to *Z. acerosa* but readily distinguished by its more elongate, glabrous leaves, larger, mostly glabrous heads on more elongate peduncles, and more numerous mostly larger rays. Clear intergrades between *Z. coahuilana* and *Z. acerosa* in regions of near contact have not been observed. None of the specimens cited above was examined by Torres (1963) in his seminal study of the *Z. acerosa* complex.

The epithet refers to the state of Coahuila, Mexico, to which the novelty is seemingly confined (Fig. 3).

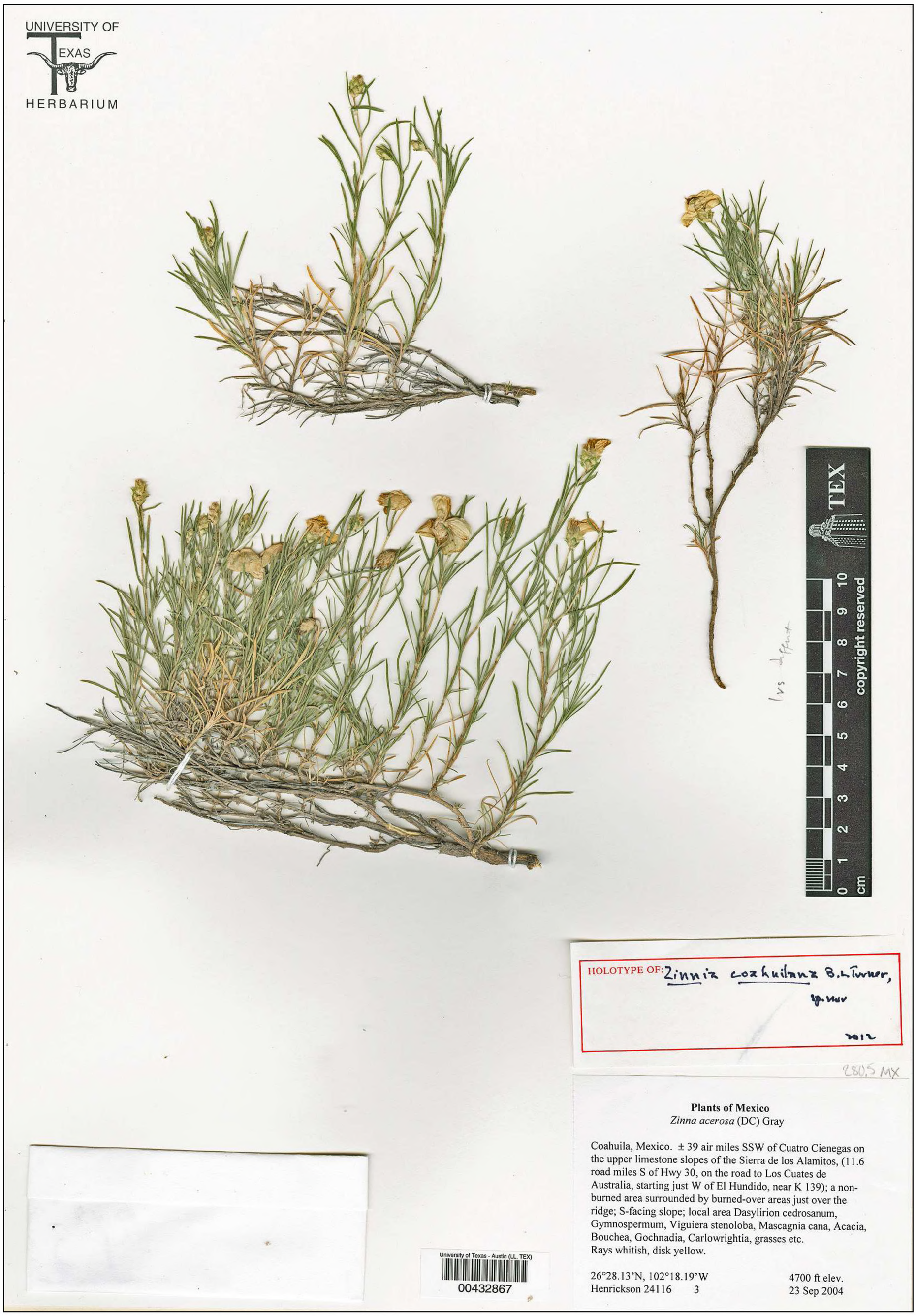
UNIVERSITY OF
TEXAS
HERBARIUM
TEX
cm 0 1 2 3 4 5 6 7 8 9 10
copyright reserved
HOLOTYPE OF: Zinnia coahuilana B.L.Turner, sp. nov 2012
280.5 MX
Plants of Mexico
Zinna acerosa (DC) Gray
Coahuila, Mexico. ± 39 air miles SSW of Cuatro Cienegas on the upper limestone slopes of the Sierra de los Alamitos, (11.6 road miles S of Hwy 30, on the road to Los Cuates de Australia, starting just W of El Hundido, near K 139); a non-burned area surrounded by burned-over areas just over the ridge; S-facing slope; local area Dasylirion cedrosanum, Gymnospermum, Viguiera stenoloba, Mascagnia cana, Acacia, Bouchea, Gochnadia, Carlowrightia, grasses etc.
Rays whitish, disk yellow.
26°28.13'N, 102°18.19'W 4700 ft elev.
Henrickson 24116 3 23 Sep 2004
University of Texas - Austin (LL, TEX)
00432867

Figure 4. *Zinnia coahuilana*, holotype TEX.

ZINNIA GUANAJUATENSIS (Calderón & Rzedowski) B.L. Turner, **comb. et stat. nov.** *Zinnia acerosa* var. *guanajuatensis* Calderon & Rzedowski, Acta Bot. Mex. 36: 78. 1996. **TYPE: MEXICO. Guanajuato.** Mpio. de San Luis de la Paz: cerca de Pregón, ladera caliza con vegetación de pastizal, 2100 m, 22 Aug 1988, *J. Rzedowski 47043* (isotype: TEX!).

Zinnia guanajuatensis is a well-circumscribed taxon readily distinguished from *Z. acerosa* by its low, prostrate habit, heads with more numerous florets, and distinctive achenes, as noted by its authors. Further, the taxon is known by seven or more, relatively uniform populations, all from the Mpio. de San Luis de la Paz, and no intergradation between the two taxa is noted, suggesting that their recognition at specific rank is appropriate.

ZINNIA OLIGANTHA I.M. Johnst., J. Arnold Arb. 21: 74. 1940. **TYPE: MEXICO. Coahuila.** [Mpio. Sierra Mojada:] road from Mohovano northeast to Estancia Station, 13 mi S of Laguna del Rey, on old dunes, 21 Sep 1938, *I.M. Johnston 7821* (holotype: GH).

Torres (1963) provided an excellent account of *Zinnia oligantha*, noting its few-flowered heads and diploid chromosome count of $n = 10$. He further noted that "Morphologically, it is most like *Z. acerosa*. It is suspected of containing a genome that is non-homologous to those in diploid *Z. acerosa* and *Z. juniperifolia*."

ACKNOWLEDGEMENTS

I am grateful to my colleague Guy Nesom for helpful suggestions on the manuscript and to Jana Kos for accompanying me on field studies in southern Texas. Distribution maps are based upon collections on file at LL-TEX and specimens cited by Torres (1963).

LITERATURE CITED

Harvard University Herbaria (HUH). 2012. Index of Botanical Specimens. Harvard University Herbaria Databases. <http://kiki.huh.harvard.edu/databases/> Accessed Feb 2012.

Robinson, B.L. and J.M. Greenman. 1896. A revision of the genus *Zinnia*. Proc. Amer. Acad. Arts 32: 14–20.

Rzedowski, G.C. and J. Rzedowski. 1996. Dos novedadas en *Zinnia* subgenus *Diplothrix* (Compositae: Heliantheae) del centro del Mexico. Acta Bot. Mex. 36: 77–83.

Torres, A.M. 1963. Taxonomy of *Zinnia*. Brittonia 15: 1–25.